

Conversations on Jesuit Higher Education

Volume 49 *Jesuit Higher Education in a Global Context*

Article 51

September 2016

Adventures Under the Northern Lights

William Gutsch

Follow this and additional works at: <http://epublications.marquette.edu/conversations>

Recommended Citation

Gutsch, William (2016) "Adventures Under the Northern Lights," *Conversations on Jesuit Higher Education*: Vol. 49 , Article 51.
Available at: <http://epublications.marquette.edu/conversations/vol49/iss1/51>



ADVENTURES UNDER THE

Northern Lights

Left: Aurora Borealis as seen over Grotfjord near Tromso, Norway
Below: The radar dish is part of the EISCAT research facility for studying the ionosphere outside of Tromso.
All images are copyright © Dr. William Gutsch.

By William Gutsch

Few phenomena in nature are as beautiful, intriguing and mesmerizing as the northern lights. As a professor at Saint Peter's University, a member of its Sustainability Council, and an astronomer and photographer, I have long been fascinated with this phenomenon. In recent years, I have traveled with colleagues and led small groups to photograph and study the lights from the pristine location of the Norwegian Arctic.

The triggering mechanism for the aurora is the sun. While it may look like the same quiescent yellow ball in the sky each day, the sun actually can be an "active" or even violent place peppered on occasion with regions where sudden brightenings called flares can occur. In turn, some of these flares can sometimes lead to eruptions of enormous numbers of charged particles out into space at speeds of over one million miles per hour. Such "coronal mass ejections" as well as huge voids in the sun's atmosphere known as "coronal holes" enhance a flow of particles called the solar wind that rapidly spreads out across the solar system and, at times, targets the earth. Indeed, in its journeys about the sun, the earth may be thought of as swimming in the outer atmosphere of the sun.

When such an enhanced stream of solar particles arrives at our planet a solar-geomagnetic storm occurs, as they buffet the invisible force field that engulfs the earth known as our magnetic field. The magnetic field, in turn, can channel these particles from the sun (mostly electrons) at enormous speeds as they spiral downward and ultimately crash into the upper levels of our atmosphere causing it to light up in the dazzling, dancing colors of the northern and southern lights. Indeed, the mechanism





Above: Arctic Day

Left: The Northern Lights over Grotfjord near Tromsø, Norway

All images are copyright © Dr. William Gutsch.

that causes our atmosphere to light up is the same as that which causes so called “neon signs” to glow brilliantly in bars and store windows at night. The oxygen and nitrogen in our atmosphere light up in vivid shades of green, red and other colors which can take on a variety of shapes including ribbons and curtains that seem to curl and flap like huge draperies in a breeze. Such auroral curtains can stretch from 50 miles to as much as 300 miles above our heads.

My particular interest in the aurora is the study of the correlation between minute-by-minute changes in the earth’s local magnetic field, as the onslaught of particles from a solar storm buffet it, and the visible manifestations

of the amazing resulting light shows we see. Advances in cameras over the last few years now permit us to record images of the aurora over the entire sky in near real time as well as more detailed images with exposures of as little as a few seconds.

We do this work around Tromsø, Norway, not only because auroras occur there almost every night but also because the University of Tromsø maintains a geophysical observatory nearby. Data from instruments known as magnetometers provide insight into what the earth's magnetic field is doing from minute to minute while our cameras provide the high resolution visual data. Images from earth-orbiting satellites give us additional, wider views from above. And, on a recent trip, in a cooperative effort, astronauts on board the International Space Station kindly shared images that they took of the aurora during flights over northern Europe while we photographed it from the ground.

In February, a few of us brave the mid-winter Arctic cold to test new equipment during the long Arctic nights. But in the fall, we typically will take a small group of photography enthusiasts with us to experience the thrill of gazing upward and being bathed in the glow of the northern lights. If you are interested in coming along on possible future trips, please contact me at wgutsch@saintpeters.edu.

Dr. William Gutsch is Distinguished Professor of the College of Arts & Sciences at Saint Peter's University.

Going Green at Saint Peter's University

Saint Peter's University's solar panels, and co-generation plant.

